

Science

The birth and death of stars

Learning objectives

- The students learn facts about the Universe and the life cycle of different kinds of stars.
- In the project stage, they find out information about black holes.

Useful vocabulary

dust galaxy gas gravity Milky Way planet
star Universe

Preparation

You could bring in a map of the sky at night. If the students are going to do the project in class, they will either need access to the internet or local maps and atlases.

The website <http://www.kidsastronomy.com/> has lots of relevant facts and activities for this age group.

Warmer

Write *start* on the board and ask the students to take away one letter to make a new word (*star*). Arrange the students into small groups. Give them two minutes to write down as many words as they can which become new words if you take away one letter. Examples: (*b*) *ring*, (*f*) *four*, (*g*) *round*, (*h*) *ear*, (*l*) *live*, (*p*) *air*, (*t*) *rain*, (*plane*) *t*, (*s*) *how*, (*tea*) *m*. As an easier alternative, write these examples on the board and ask the students to take away a letter to make a new word.

- 1 Books closed, ask questions to see what the students know about the Universe and elicit vocabulary they might know, for example: *What's the name of the place where we live?* (Earth) *Is it a star or a planet?* (a planet) *Is the sun a planet?* (no, a star) Drop something on the floor and ask *Why does it fall?* (because of gravity)

Background information: The largest natural unit is the Universe, which is practically infinite. The Universe contains galaxies, which in turn contain planets and stars. Basically, stars are much bigger than planets and planets go round them, so our Earth (a planet) goes round the Sun (a star). The Milky Way is the galaxy that contains the planets and bodies which go around our Sun (the Solar System).

Tell the students to use the words in the box to complete the sentences.

Fast finishers

The students write down the names of the nine different planets and check if they are the same names in English (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto). Note – there is some controversy as to whether Pluto is a planet. For strong students, an extra step could be to get into groups and make a mnemonic to remember the order of planets. A well-known example is: *My very educated mother just served us nine pizzas*.

Answers

- 1 universe 2 star 3 Gravity 4 planet 5 moon 6 space
- 7 explosion 8 galaxy

- 2 Tell the students to look at the first paragraph of the text and ask *What is the name of our galaxy?* (the Milky Way)
The students try and answer the questions themselves, then check with the text.

Fast finishers

Ask the students to calculate how many seconds there are in a day (86,400) and then how many years 100 billion seconds would be (about 3,170 years).

Answers

- 1 There are about 100 billion stars in our galaxy.
- 2 Stars are born in clouds called nebulae.
- 3 Stars can be blue, white, yellow, orange or red.
- 4 When small stars die, first they get bigger and hotter, then they lose their gas and become white dwarfs. Large stars end in a supernova, which is a big explosion.

- 3 Ask the students to find the items in the pictures and then answer the questions.

After feedback, ask some more questions to check understanding, *How does the star become a ball shape?* (Gravity pulls the gases and dust together.) *What makes a star bright?* (It burns.) *What is the most common kind of star?* (red star) *Why is a supernova called a factory of the universe?* (The process makes heavy materials such as iron.)

Answers

- 1 Red stars are the smallest and coolest. Blue stars are the biggest and hottest.
- 2 A supernova is a huge explosion. A nebula is a huge cloud of gas and dust where stars are born.
- 3 A white dwarf is made when a small star dies. A neutron star is made when a large star dies. A neutron star is also smaller, hotter and heavier than a white dwarf.

Extension activity

Ask the students to go outside one clear evening and draw a picture of the stars they see. They could then try and find out the names of the brightest stars/constellations and compare with other students in the class.

They could also find pictures of the constellations of the Signs of the Zodiac, starting with their own star sign.

Subject learning

In the next stage, the students are going to find out and write about black holes. Encourage a class discussion on what they have learned so far. If appropriate, do this in the students' own language. Use these questions:

Give me an example of a planet.

What is the difference between a planet and a star?

How are stars made?

How do they die?

What is the result of a supernova?

Also check some of the vocabulary learned in the lesson, for example get them to write their own gapped sentences for the vocabulary in Exercise 1 to give to other groups.

Cooler

Do a simple gravity experiment. Get the students to stand on a raised surface – it could be the top of some stairs or even a chair (be careful!), and drop three objects – a ball, a stone, a coin. Get the students to predict the order in which they will hit the floor and then see if they are right. In fact, all of the objects will hit the ground at the same time.

Get the students to find out the reason for this (they may need to explain in their own language). (Gravity affects all objects in the same way; it doesn't matter how heavy they are.) Ask them why, then, a person in a parachute would fall more slowly than someone of the same weight not in a parachute. (A greater surface area means more wind resistance and slows the object down.)

Project

- Arrange the students into groups of three or four. Tell them to find out some information about black holes at home. They should make notes and print or draw pictures.
- In class, they should compare their information, write a short description in full sentences and choose the best pictures.
- Together they make a presentation to the class.

Sample answer

A black hole is a place in space with very strong gravity. When stars explode in a supernova, they can make black holes. Light cannot get out of a black hole because of the gravity. The biggest black holes are millions of times bigger than Earth. Black holes are everywhere but the nearest one is very far away.